

-39-

CLAIMS

1. An inhalation device for transpulmonary administration comprising:

a chamber for containing a pharmaceutical composition which is pulverized into fine particles by an air-generated impact for dispersal in air;

an air inlet flow path for introducing to the chamber outside air to apply the air-generated impact to the pharmaceutical composition and for injecting the outside air toward the pharmaceutical composition;

an inhalation flow path having a suction port located inside the chamber to inhale the pulverized pharmaceutical composition;

a housing for accommodating the chamber, the air inlet flow path, and the inhalation flow path;

a mouthpiece provided at one end of the housing, the mouthpiece being provided with a mouth-side flow path which communicates with the inhalation flow path, and an auxiliary flow path for directly inhaling the outside air which does not communicate with the inhalation flow path and the mouth-side flow path;

wherein the inhalation device for transpulmonary administration is configured such that the air-generated impact is applied to the pharmaceutical composition by the outside air which flows into the chamber by inhalation-

-40-

induced pressure generated when a user (patient) inhales air, and the pulverized pharmaceutical composition is introduced to the mouth-side flow path, and at the same time the outside air is directly introduced to the 5 auxiliary flow path by the inhalation-induced pressure.

2. An inhalation device for transpulmonary administration comprising:

a chamber for containing a pharmaceutical 10 composition which is pulverized into fine particles by an air-generated impact for dispersal in air;

an air inlet flow path for introducing to the chamber outside air to apply the air-generated impact to the pharmaceutical composition and for injecting the 15 outside air toward the pharmaceutical composition;

an inhalation flow path having a suction port located inside the chamber to inhale the pulverized pharmaceutical composition;

a housing for accommodating the chamber, the air 20 inlet flow path, and the inhalation flow path;

a mouthpiece provided at one end of the housing, the mouthpiece being provided with a mouth-side flow path which communicates with the inhalation flow path and a divider having an orifice at least one of the mouth-side 25 flow path or the inhalation flow path for reducing the

-41-

diameter of the flow path by forming a step part;,

wherein the inhalation device for transpulmonary administration is configured such that the air-generated impact is applied to the pharmaceutical composition by the
5 outside air which flows into the chamber by inhalation-induced pressure generated when a user (patient) inhales air so that the pulverized pharmaceutical composition is introduced to the inhalation flow path and the mouth-side flow path, and also passes through the orifice.

10

3. The inhalation device for transpulmonary administration according to Claim 2, wherein a plurality of dividers each having an orifice are provided at appropriately spaced intervals.

15

4. The inhalation device for transpulmonary administration according to Claim 2 or 3 having a mouthpiece that includes an auxiliary flow path for directly inhaling the outside air which does not
20 communicate with the inhalation flow path and the mouth-side flow path;

wherein the inhalation device for transpulmonary administration is configured such that the pulverized pharmaceutical composition is introduced to the inhalation flow path and the mouth-side flow path, and at the same
25

-42-

time the outside air is directly introduced to the auxiliary flow path by the inhalation-induced pressure.

5. An inhalation device for transpulmonary administration
5 comprising:

a chamber for containing a pharmaceutical composition which is pulverized into fine particles by air-generated impact for dispersal in air;

10 an air inlet flow path for introducing to the chamber outside air to apply the air-generated impact to the pharmaceutical composition and for injecting the outside air toward the pharmaceutical composition;

an inhalation flow path for inhaling the pulverized pharmaceutical composition;

15 a housing for accommodating the chamber, the air inlet flow path, and the inhalation flow path;

20 a mouthpiece provided at one end of the housing, the mouthpiece being provided with a mouth-side flow path which communicates with the inhalation flow path, and an auxiliary flow path for inhaling outside air which is not used for applying air impact to the pharmaceutical composition, and does not flow via the chamber, and furthermore allows the inhaled outside air to flow into the mouth-side flow path through an air outlet which opens
25 into the mouth-side flow path;

-43-

wherein the inhalation device for transpulmonary administration is configured such that the air outlet allows the outside air to flow in the air discharge direction of the mouth-side flow path and is formed in a ring shape along the inner circumferential wall surface of the mouth-side flow path; and

the pharmaceutical composition is pulverized by the air impact generated by the outside air flowing into the chamber by inhalation-induced pressure that is generated when a user (patient) inhales air, and the pulverized pharmaceutical composition flows into the mouth-side flow path surrounded by the outside air flowing into the mouth-side flow path from the ring-shaped air outlet.

15

6. The inhalation device for transpulmonary administration according to Claim 5;

wherein the inhalation device for transpulmonary administration is configured such that a divider having an orifice for reducing the diameter of the flow path is formed at the mouth-side flow path; and

outside air containing the pulverized pharmaceutical composition passes through the orifice, and thereafter is surrounded by outside air flowing into the mouth-side flow path from the ring-shaped air outlet.

-44-

7. The inhalation device for transpulmonary administration according to Claim 6; wherein a flow-path length of the orifice is formed to be elongated to the air discharge direction of the mouth-side flow path

5
8. The inhalation device for transpulmonary administration according to any of Claims 1 through 7, comprising:

10 the chamber for containing a non-powder cake-like form which disperses in air by an air-generated impact and accommodating a vessel sealed by a sealing member; and

15 an unsealing member for releasing the sealed condition provided by the sealing member;

wherein the inhalation device for transpulmonary administration is configured such that the vessel is unsealed by the unsealing member to establish communication between the chamber and the inside of the 20 vessel; and

the air-generated impact is applied by the inhalation-induced pressure to the pharmaceutical composition contained in the vessel.

25 9. The inhalation device for transpulmonary

-45-

administration according to any of Claims 1 through 8, further comprising a check valve to prevent the pulverized pharmaceutical composition from flowing to the outside from the air inlet flow path.

5

10. An inhalation device comprising:

a main body formed cylindrically;

a mouthpiece provided at one end of the main body;

10 a vessel provided at the other end of the main body, the vessel being for containing a pharmaceutical composition which is pulverized into fine particles by an air-generated impact for dispersal in air;

15 an inhalation flow path formed of the inner side space of the main body, the mouth piece and the vessel, the inhalation flow path being for flowing outside air containing the fine particles of the pharmaceutical composition from the vessel-side toward the mouthpiece-side;

20 an air inlet port for introducing the outside air to the inhalation flow path; and

25 a divider for dividing the inhalation flow path, the divider having an orifice for reducing the diameter of the inhalation flow path and being located downstream of the air inlet port;

-46-

wherein the inhalation flow path has such a capacity that an air-generated impact can be applied to the pharmaceutical composition by the outside air, which is fed from the air inlet port into the inhalation flow path located upstream of the divider by an air inhalation of user.

11. The inhalation device according to claim 10 comprising:

10 an air outlet which opens into the inhalation flow path; and

an auxiliary flow path for feeding the outside air into the inhalation flow path through the air outlet by the air inhalation of user;

15 wherein the air outlet is provided at such a position that the outside air flowing in from the air outlet is inhaled into the mouth of the user without passing through the orifice.